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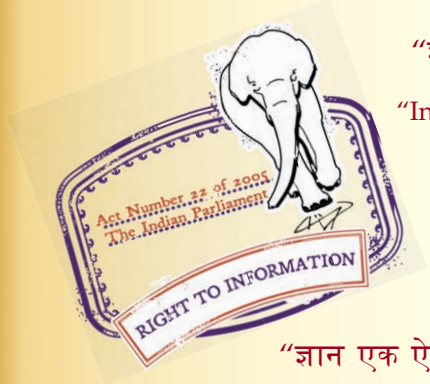
IS 3167 (1982): Cap copper alloy strip [MTD 8: Copper and Copper Alloys]



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IS : 3167 - 1982
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SPECIFICATION FOR CAP COPPER ALLOY STRIP

(First Revision)

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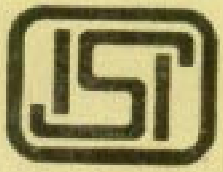

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 2

October 1982

Indian Standard

SPECIFICATION FOR CAP COPPER ALLOY STRIP

(First Revision)

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Indian Standard

SPECIFICATION FOR CAP COPPER ALLOY STRIP

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 30 June 1982, after the draft finalized by the Copper and Copper Alloys Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 Cap copper alloy strips are used for the manufacture of detonator caps and shells. This standard was published in 1965. In this revision, requirements for hardness, reverse bend tests and grain size requirement have been revised and limit of impurity for manganese has been incorporated in the chemical composition.

0.3 While preparing the revised standard, necessary assistance has been derived from DEF STAN 95-11/1 Bullet envelope materials, dated 22 Feb 1980, issued by Ministry of Defence, Directorate of Standardization, London.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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1. SCOPE

1.1 This standard covers the requirements for cold rolled and annealed cap copper alloy strips.

*Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definition as given in IS : 3288 (Part I)-1981* shall apply.

2.1 Strip — Flat product over 0·15 mm thick and up to and including 10 mm thick, of any width, and generally not cut to length; usually in coil, but may be flat or folded.

3. SUPPLY OF MATERIAL

3.1 General requirements relating to the supply of material shall be as laid down in IS : 1387-1967†.

4. MANUFACTURE AND QUALITY

4.1 The strip shall be finished by cold rolling with subsequent annealing and be available in the hardness range given in **6.1.**

4.2 Use of Scrap — Clean process scrap and electrical scrap may be used in the charge. Clean process scrap consists of ingot discards, webbing, large clippings, and partly, or completely formed components from cap copper alloy to this standard. It may include small clippings, swarf turnings and millings of cap copper alloys to this standard, if these are free from contamination to the satisfaction of the purchaser. It may also include cap copper alloy rejected for being slightly outside the limits of composition, with the agreement of the purchaser.

When continuous or semi-continuous casting with an underpouring technique is employed, ingot discards and clean process scrap other than cap copper alloy to this standard (as detailed in the following note) may be used so long as the chemical composition of the cast complies with Table 1.

NOTE — Clean process scrap is scrap arising from the production of strip or sheet or its subsequent fabrication into components and is free from contamination.

5. CHEMICAL COMPOSITION

5.1 The material, when analysed, shall have the chemical composition given in Table 1.

5.2 The chemical composition shall be determined either by the method specified in IS : 440-1964‡ or any other established instrumental/

*Glossary of terms for copper and copper alloys: Part I Cast form and wrought form (main types) (*second revision*).

†General requirements for the supply of metallurgical materials (*first revision*).

‡Methods of chemical analysis of copper (*revised*).

chemical method. In case of dispute, the procedure in the latest edition of IS : 440-1964* for chemical analysis shall be the referee method.

TABLE 1 CHEMICAL COMPOSITION

(*Clauses* 4.2 *and* 5.1)

CONSTITUENT	PERCENT
Copper (including silver)	95-98
Tin, *Max*	0·01
Lead, *Max*	0·02
Iron, *Max*	0·05
Nickel, *Max*	0·10
Phosphorus, *Max*	0·01
Arsenic, *Max*	0·02
Antimony, *Max*	0·01
Bismuth, *Max*	0·002
Manganese, *Max*	0·04
Other elements (each), *Max*	0·005
Zinc	Remainder

NOTE 1 — The non-metallic impurity 'Sulphur' is not normally estimated but may be in excess of 0·005 percent provided the properties and suitability of the material are not adversely affected.

NOTE 2 — Analysis shall regularly be made only for the elements listed in the table except zinc (which is remainder). If, however, the presence of other elements is suspected owing to the occurrence of difficulties in manufacture or service, further analysis shall be made to determine that harmful impurities are not present in excess of the amount stated (0·005 percent).

6. PHYSICAL PROPERTIES

6.1 Hardness when tested in accordance with IS : 2866-1965† shall be 55 to 75 HV.

6.2 Bend Test

6.2.1 Strip up to and including 2·54 mm thick shall be subjected to a reverse bend test. Strip over 2·54 mm thick shall be subjected to a single bend test. Details of these tests are given below and the details of the test requirements, width of test piece, etc, are given in Table 2.

*Methods of chemical analysis of copper (*revised*).

†Method for Vickers hardness test for copper and copper alloys.

6.2.2 *Reverse Bend Test* — A test piece of 13 mm in width and of convenient length be cut from the material so that its major axis is at 90° to rolling direction. If the width of the material is less than 50 mm a longitudinal test piece having its major axis parallel with the rolling direction may be used. The longer side of the test piece be rounded and smoothened longitudinally so that the cross section has approximately semi circular ends. Part of the test piece shall be gripped between two formers each having an inner edge radius equal to three times the thickness of the material. The free end of the test piece shall be bent through 90° over one former and bent back to its original position (1 bend), it shall then be bent through 90° over the other former and back to its original position (2 bends), the necessary constraint being applied to maintain contact between the test piece and the former. Repeating this procedure until cracking occurs and a kink appears in the test piece at the crack; failure is defined as the formation of a kink that prevents the test piece from following the curve of the former. The number of completed bends before failure shall not be less than 8.

6.2.3 *Single Bend Test* — A test piece of approximate width laid down in Table 2 and of convenient length shall be cut from the strip in any direction at the discretion of the inspecting authority and sharp edges be removed and side smoothened. The test piece shall not crack when bent through 180° over a former of radius equal to half the thickness of the material.

TABLE 2 BEND AND REVERSE BEND TEST REQUIREMENTS

(*Clauses* 6.2.1 *and* 6.2.3)

Thickness of Strips (*t*) (mm)	Width of Test Piece (mm)	Type of Test	Radius of Former	Number of Bends
Up to and including 2·54	13	Reverse	3*t*	8 *Min*
Over 2·54	25	Single	1/2*t*	1 of 180°

6.3 Grain Size — Unless otherwise specified, the average grain size of the material shall not be greater than 0·065 mm.

6.3.1 The average grain size may be determined if specified by the purchaser, by etching the surface of the material to reveal its grain structure and then comparing this, at a magnification of 75, with the grain size standard given in IS : 4748-1968*.

*Methods for estimating average grain size of metals.

7. DIMENSIONS AND TOLERANCES

7.1 The dimensions and tolerances, unless otherwise stated by the purchaser, shall be as laid down in IS : 3052-1974*.

7.2 Edgewise Curvature — The edgewise curvature (depth of arc) in any length shall not exceed 15 mm in any length of 2 metres.

8. FREEDOM FROM DEFECTS

8.1 The strips shall be reasonably clean, sound and free from surface and other visible defects.

9. SAMPLING AND RETEST

9.1 Sampling — When tests are specifically called for by the purchaser, quantities of strip of the same width, thickness and temper shall be batched together. For each batch the number of samples taken shall be as given below:

The samples shall be cut off cold and shall receive no further treatment (except that they may be machined to the shape of the test piece) before being tested.

9.1.1 From batches weighing up to 1 000 kg, the number of samples taken shall be in the proportion of one per 200 kg of material submitted and fractional remainder being considered as 200 kg. Where strip is supplied in coils weighing more than 200 kg, one sample shall be taken from each coil to provide the necessary test pieces. If the purchaser requires more than one sample to be taken from any coil, the method of taking the additional sample or samples shall be agreed to between the supplier and the purchaser.

9.1.2 Batches exceeding 1 000 kg shall be sub-divided into smaller batches of not less than 200 kg and not more than 1 000 kg to which the provision of **9.1.1** shall then apply.

9.2 Retests — Should any one of the test pieces first selected by the purchaser or his representative fail to pass any of the prescribed tests, two further samples from the same batch shall be selected for testing, one of which shall be from the strip from which the original test sample was taken, unless that strip has been withdrawn by the supplier. Should the test piece from both these additional samples pass, the batch represented by the test samples shall be deemed to comply with the standard. Should

*Dimensions for wrought copper and copper alloys sheet, strip and foil (for general engineering purposes) (*first revision*).

the test pieces from either of the additional samples fail, the batch represented by the test samples shall be deemed not to comply with this standard. The supplier shall, if required, certify that strip or coil complies with the requirements of this standard appropriate to the material ordered.

10. PACKING

10.1 Unless otherwise required by the purchaser, the strip shall be supplied in coils of continuous length and the weight of each coil shall be subject to agreement between the purchaser and the manufacturer. Each package may weigh 125 kg.

11. MARKING

11.1 Each coil, at its open end, shall be stamped with suitable marks to indicate the grade, annealing or rolling, batch number, name of manufacturer, mass and any such information required by the purchaser.

11.1.1 The material may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	$N = 1\ kg.m/s^2$
Energy	joule	J	$1\ J = 1\ N.m$
Power	watt	W	$1\ W = 1\ J/s$
Flux	weber	Wb	$1\ Wb = 1\ V.s$
Flux density	tesla	T	$1\ T = 1\ Wb/m^2$
Frequency	hertz	Hz	$1\ Hz = 1\ c/s\ (s^{-1})$
Electric conductance	siemens	S	$1\ S = 1\ A/V$
Electromotive force	volt	V	$1\ V = 1\ W/A$
Pressure, stress	pascal	Pa	$1\ Pa = 1\ N/m^2$

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Printed at Printograph, New Delhi, India